



Methodological and Ideological Options

A methodology for facilitating the feedback between mental models and institutional change in industrial ecosystem governance: A waste management case-study from northern Finland

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ABSTRACT

Deliberative environmental policy links the formal institutional setting within which environmental policy takes place and the informal ways of thinking and doing by those whose daily work the policy influences. Despite an extensive theoretically oriented literature on policy deliberation, little methodological advice exists relating deliberation to the two domains it aims to link, i.e., the formal and informal institutions. In this paper, we develop a methodology for environmental policy deliberation that is grounded in institutional theory and theories explaining the cognitive practices of individuals in action situations. The methodology has three stages. First, we outline the problem setting on the basis of the stakeholders' mental model analysis. Second, more specific research problems and proposed solutions are formulated collaboratively with researchers from different fields. Third, the hypotheses are tested and challenged in a workshop with the interviewed stakeholders and re-formulated into final institutional recommendations. We illustrate the success of the procedure with a case study on a regional industrial complex located in the Bothnian Arc of northern Finland.

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1. Introduction

Deliberative environmental policy can be seen as a procedure for linking the formal institutional setting within which environmental policy takes place and the informal ways of thinking and doing by those whose daily work the policy influences. Despite an extensive theoretically oriented literature on policy deliberation since the 1990s (e.g. Baber and Bartlett, 2005; Dryzek, 1990, 2000, 2010; Fischer, 2000; Forester, 1999; Hajer and Wagenaar, 2003), there is a dearth of theoretically grounded methodological advice that would relate deliberation to the two domains it aims to link, namely, the formal and informal institutional settings. In this paper, we develop a methodology for environmental policy deliberation and solution seeking that is grounded in institutional theory and theories explaining the cognitive practices of individuals in action situations. We illustrate the success of the procedure with a case study on a regional industrial complex located in the Bothnian Arc of northern Finland. We emphasize that our methodology for analyzing the feedback between formal and informal institutions only sets the stage for designing deliberative environmental policies, but not for implementing them.

Policy deliberation stems from the notion of deliberative democracy, which is intellectually rooted in Habermasian communicative

rationality and Rawlsian public reason (Habermas, 1984; Rawls, 1972; for an overview of recent discussions of the field, see e.g. Bohman, 2000; Chambers, 2003; Guntman and Thompson, 2004). It is understood as a well-reasoned point of departure for the development and legitimization of flexible institutions of environmental governance (Berkes and Folke, 1998; Dietz et al., 2003). Ideally, deliberative democracy is to produce socially, economically and environmentally sustainable outcomes through active involvement of and communication among stakeholders. In the real world, however, many problems in the governance of natural resources are closely related to the *practices* of policy deliberation and institutional lock-ins (North, 1990, 2005; Young, 2002).

Parallel to policy theorists' discussion of deliberation, new institutionalist scholars have begun to emphasize the significance of the strategic context of the actors in different situations as well as the feedback dynamics between formal institutions and specific socio-cognitive practices (e.g. Denzau and North, 2000; North, 2005; Young, 2002). In theory, we know something about deliberation and the institutional setting in which it should take place, but in practice precious little is known about the feedback mechanisms between institutions and mental models in environmental governance. The socio-ecological systems under governance today are far from stable and clearly bounded units. In many cases they are rather spontaneously emerging, self-organizing networks connecting various stakeholder groups with different interests and backgrounds. When the idea of deliberation is introduced to this kind of institutional environment, novel knowledge management is also required. This does not

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only mean that information is properly shared among the stakeholders, it also means that different types of knowledge are actively integrated into new understandings of the system.

Although institutional theorists have advised us to take the cognitive dimension seriously, there is little empirical research on the topic. In this paper we develop a methodology for examining the foundations of environmental policy deliberation with a case in the regulation of heavy industry in an ambiguous institutional setting. We study what happens in the mental models of different stakeholder groups of an industrial ecosystem when the formal institutional setting changes. We show that even though the mental models of the groups appear very different, it is nonetheless possible to find constructive and adaptive solutions. Institutional change—such as a change in the legislation that directs certain industrial activities—opens up a unique opportunity to study the feedback between formal institutions and the mental models emerging in policy deliberation. The situation offers an exceptional opportunity to analyze the different ways of understanding governance procedures. As will become clear, stakeholder groups differ not only in their objectives, but also in the fundamental conceptions of the rules, tools and practices of governance.

We have two aims: first, to formulate an analytical framework to describe what happens in the stakeholders' mental models when the institutional setting changes; and second, by applying the framework, to illustrate how an explicit understanding of the changes in the stakeholders' mental models can increase their capabilities to adapt to the changed operational environment. We show how to design the deliberative process in a way that creates a constructive feedback loop between the formal administrative interpretation of the changed legislation and the informal mental models of the stakeholders. The paper thus contributes to theorization of the role of cognition in institutional change with a case study in environmental policy.

2. Material and Methods

2.1. Case Study

Our research is based on a case study of industrial recycling in the Bothnian Arc region in northern Finland. The case study consists of 7 heavy industrial units in metals, wood processing and chemicals, located in 4 municipalities (Kemi, Kokkola, Tornio and Raahen). Regional industries hold technical potential for increased collaboration in material efficiency (Salmi et al., 2011, 119–122). Therefore our case study offers an interesting opportunity to examine the impacts of new waste legislation on an industrial ecosystem striving for more efficient use of natural resources. Industrial ecosystems are optimized in such a manner that industrial waste from one plant can serve as raw material for another plant (Ayres, 2002; Frosch and Gallopoulos, 1989; Jelinski et al., 1992; Lifset and Graedel, 2002). Even though theorists of industrial ecology often emphasize that the various linkages of an industrial ecosystem mean different things for different sectors and levels of society, the institutional factors that shape those meanings are often ignored in actual case studies in the field (Opoku, 2004; Wallner, 1999).

EU's waste policy was reformed in 2008 with the new Waste Framework Directive (2008/98/EC) (European parliament and the council of the European Union, 2008). The directive led to large scale reforms of waste legislation in member countries. In Finland the new waste legislation came into effect in 2012. The main goal of the new directive was to strive for sustainability by strengthening the so-called Waste Hierarchy, meaning primarily two things: prevention of waste generation and encouragement of recycling in various ways, such as juridical transformation of industrial waste materials into materials that can be used by another industry. The new end-of-waste (EOW) procedure of the directive refers to criteria

that waste material must meet to become classified as a product or by-product. The nuances of waste legislation are crucial for industrial recycling because the formulation of key legal terms determines whether a particular secondary material flow is defined as *by-product* or *product* with which one can do business, or as *waste*, the treatment of which only causes extra costs. Waste legislation and its different interpretations at different levels of administration can therefore significantly increase or hinder industrial recycling.

2.2. Analytical Framework

To study the linkages and feedback mechanisms between different institutions identified in Section 1, we adopted an analytical framework from activity theory, originally introduced by Leont'ev (1978), Luria (1976) and Vygotsky (1978, 1981) and further developed for example by Engeström (1987, 1999, 2001, 2010). In activity theory, artifact-mediated and object-oriented activity is the unit of analysis. An activity system model is used to conceptualize the activity and the factors that affect it within a social context (Engeström, 2001, 135–137). An activity system consists of the following elements (Fig. 1): a *subject* that is an individual or group whose perspective is analyzed, an *object* that is the target of the activity (e.g. experiences or physical products), *mediating artifacts* that support subject(s) to achieve the outcomes of the activity (e.g. tools used), a *community* that refers to people who share the objective with the subject (subject is a member of a community), *rules* that regulate actions within the system (e.g. implicit and explicit institutions within the community), and the *division of labor* that defines organizational tasks critical for a community to achieve its objectives (e.g. explicit or implicit descriptions of the different roles of actors within the community).

The activity system framework resembles the institutional analysis and development (IAD) framework developed by Ostrom (2005, 3–133), which we also considered using. The IAD contains an action arena with action situations (corresponding to division of labor in activity system) and participants (subject in activity system), influenced by biophysical/material conditions (mediating artifacts and object), attributes of community (community) and rules (rules). In an IAD, the participants' interaction in the action arena is what facilitates the feedback between formal and informal institutions. However, the activity system framework that we applied enables us to capture a snapshot of a particular action situation from the point of view of a single stakeholder. We therefore consider the looser notion of interactions in the activity system to better suit our empirical material and analytical purposes than the more specific attribution of causal relationships presented in the IAD.

We use this particular activity system framework because it makes possible first, to describe the mental models of different stakeholder groups obtained from the interviews, and second, to facilitate

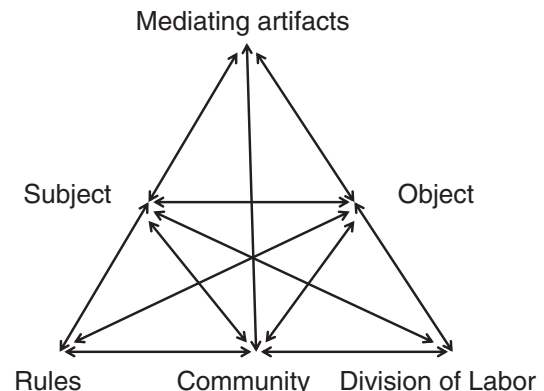


Fig. 1. Elements of the activity system (Engeström, 1999).

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